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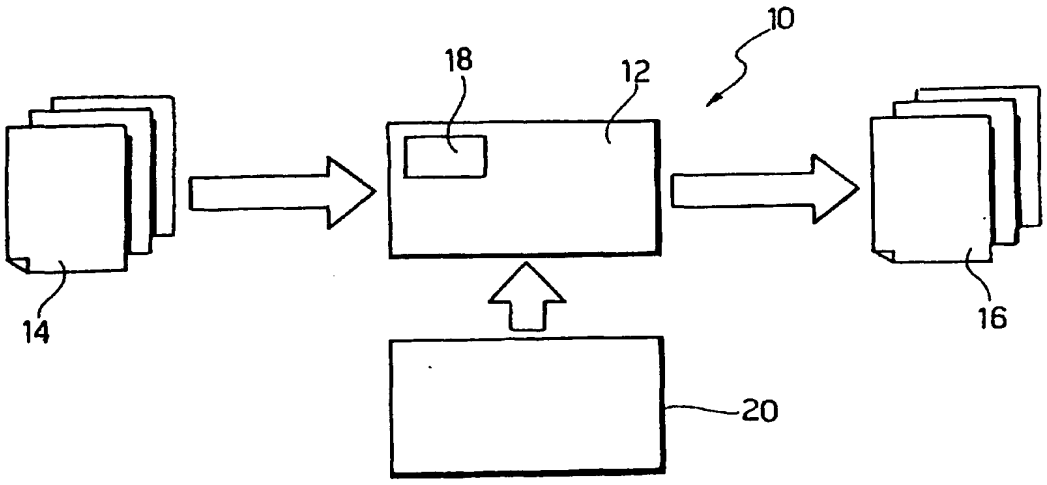
(54) Title: METHOD FOR DECODING CHARGING DATA RECORDS IN MOBILE TELEPHONE NETWORKS AND THE RELATIVE SYSTEM



(57) Abstract: The invention relates to the decoding of charging data records (CDR) generated in a mobile telephone network. These records consist of files to be decoded that can be described on the basis of a formal description of the ASN.1 type. On the basis of: i) a description of the type of record to be decoded corresponding to at least a first type (GSM) and at least a second type (GPRS) of records to be decoded, and on the basis of ii) said formal description of the type ASN.1 of the records to be decoded, an interpreter of the ASN.1 type (18) self-generates an updated version of decoder (10) of at least a first and at least a second type according to the type of record to be decoded. The files to be decoded are sent to the decoder created in this way, so as to output the decoded CDR records in text format.

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Declarations under Rule 4.17:

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

METHOD FOR DECODING CHARGING DATA RECORDS IN MOBILE TELEPHONE NETWORKS AND THE RELATIVE SYSTEM

Technical Field

The present invention tackles the problem of decoding the so-called Charging Data Records (normally known by the acronym CDR) emitted by the nodes of a mobile telephone network.

Background Art

These charging data records are currently decoded by employing solutions based on software applications, which, for example, decode GSM network records separately from those of an associated GPRS network. Specifically, the application is developed manually starting from the record coding specifications, and each time there is a modification/new release of the GSM and/or GPRS systems and when new functions are added, parts of the software must be to some extent rewritten.

There is consequently a need to provide solutions that can decode both GSM and GPRS format records, and for solutions that take into account the frequent updating of the record format after the introduction of new GSM and GPRS network services/performances, as well as the possibility of easy extension of the application to new functions such as UMTS.

This objective can be reached, according to this invention, by using a method that has the features referred to specifically in the claims that follow. The invention also refers to the relative system.

Summary of the invention

The solution, according to this invention, basically envisages the automatic generation of the logic that decodes the records. Whereas known solutions include the rewriting of the record decoding software whenever variations are

introduced by the MSC manufacturer (Mobile Switching Center) or SGSN/GGSN (Serving GPRS Support Node and Gateway GPRS Support Node), the solution according to the invention simply requires the manufacturer to provide a formal record description of the ASN.1 type (Abstract Syntax Notation One). The solution, according to the invention, then uses this description to directly generate the code that decodes the data record. As a result, the decoder adaptation times can be cut from several weeks to a few days, making it easy to keep right up to date with the mobile network's frequent alterations.

The solution, according to the invention, includes the decoding of GSM records and GPRS records, which means that a single tool can be used on a mixed network employing both technologies. This is particularly advantageous if you consider that the operators of large-scale mobile telephone networks use both technologies in the network, in conditions in which the network update is carried out asynchronously. The solution, according to the invention, proposes to decode the data records for GSM and GPRS functions, but its main features also make it easy and quick to extend the solution to other functions such as UMTS.

Brief Description of Drawings

The invention is hereafter described, by way of a non-limiting example only, with reference to the annexed drawings wherein:

- Figure 1 is a functional block diagram illustrating the general architecture and the input/output/control relationships of a system that operates according to the invention, and
- Figure 2 is a flow diagram illustrating the main stages into which the method is divided according to the invention.

Detailed description of the preferred embodiments

As shown in Figure 1, the illustrated system, referred to with the number 10, has a main element, which is a processing core 12, destined to input a file to be decoded 14, which then outputs a corresponding decoded file 16. The system 12 works on the basis of a decoding logic that is directly self-generated from the formal description ASN.1 contained in a file 20 received from the outside. As already known, the description of the records in ASN.1 (or equivalent, and consequently a description "of the ASN.1 type") constitutes a set of specifications that describe the coding format of the records in ASN.1 Notation or equivalent.

The input or log file 14 contains the records generated by the real network equipment (MSC for GSM records or SGSN/GGSN for GPRS records) in coded hexadecimal format.

The decoding operation is run on the basis of the set of user parameters that characterise the log file, the type of record (SGM/GPRS) and the output format.

In particular, starting from an initial step 100, the first steps in the operating sequence of the system 10 include the reading of the parameters sent to output, which are:

- type of record to be decoded: GSM or GPRS (read by the system in step 102),
- name of the log file to be decoded (step 104),
- decoding format, i.e. the output format of the decoded file (read in step 106); this format may be "long", when the decoding, the length and the contents in hexadecimal are given for each record field, or "short", when only the decoding is given for each record field,
- log file containing the records to be decoded (step 108), and
- formal record description of the ASN.1 type (step 110).

Depending on the record description, an interpreter, such as an ASN.1 interpreter, included in the processing core 12 (see block 18 in Figure 1) creates and runs a series of procedures (collectively referred to as 112), which in terms of a self-generation operation, create an updated version of the GSM decoder (step 114) or GPRS decoder (step 116) according to the type of record read in step 102.

The type of decoder selected (114 or 116) according to the parameter indicating the type of record (step 102) is further parameterised according to the parameters read in steps 104 and 106 (log file name and decoding format).

Once the decoder has been updated and programmed, it inputs (step 118) the file 14 containing the records to be decoded, and then outputs (step 120) the file containing the records decoded in text format. Reference 122 indicates the final step in the procedure.

Naturally, numerous changes can be made to the construction and embodiments of the invention envisaged and illustrated herein, without however departing from the scope of the present invention.

CLAIMS

1. Method for decoding charging data records (CDR) generated in a mobile telephone network, said records consisting of files to be decoded that can be described on the basis of a formal description of the ASN.1 type, characterised by the fact that it includes the following operations:

- identifying (102) the type of record to be decoded, the identification corresponding to at least a first type (GSM) and at least a second type (GPRS) of records to be decoded,
- providing a decoder (10) including an interpreter of the ASN.1 type (18),
- providing (110) said formal description of the ASN.1 type of the records to be decoded,
- self-generate, by means of said interpreter (18) and in relation to the aforementioned description, an updated decoder version of at least a first (114) and at least a second (116) type according to the type of record to be decoded, and
- supplying (118) said files to be decoded (14) to the decoder (114, 116) self-generated in this way, so as to output (120) said decoded records in text format.

2. Method as per claim 1, characterised by the fact_that said at least a first type of record and said at least a second type of record is selected from the group consisting of GSM, GPRS or UMTS records.

3. Method as per any one of the previous claims, characterised by the fact that it includes the operation of selecting one of the said at least first (114) and said at least second (116) type of decoder, and of parameterising the decoder selected in relation to at least one parameter selected from the group made up of:

- name of log file to be decoded (104), and

- output format of the decoded file (106).

4. Method as per claim 3, characterised by the fact_that said output format of the decoded file is selected from the following:

- a long format, in which the decoding, the length and the contents in hexadecimal are given for each record field, and
- a short format, for which only the decoding is given for each record field.

5. System for decoding charging data records (CDR) generated in a mobile telephone network operating according to the method as per any one of the previous claims.

FIG. 1

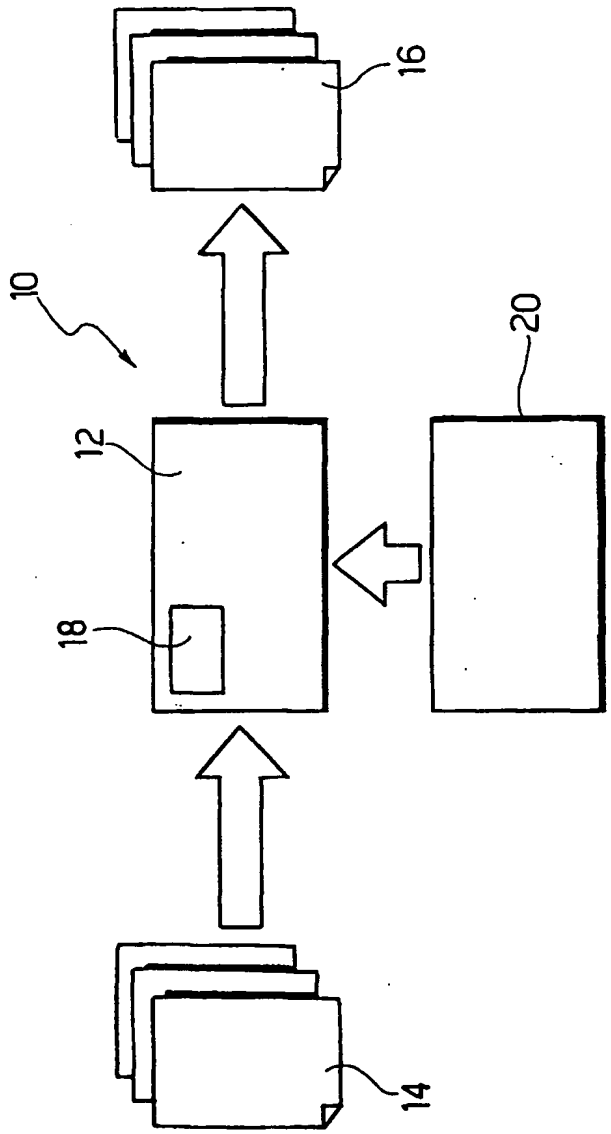
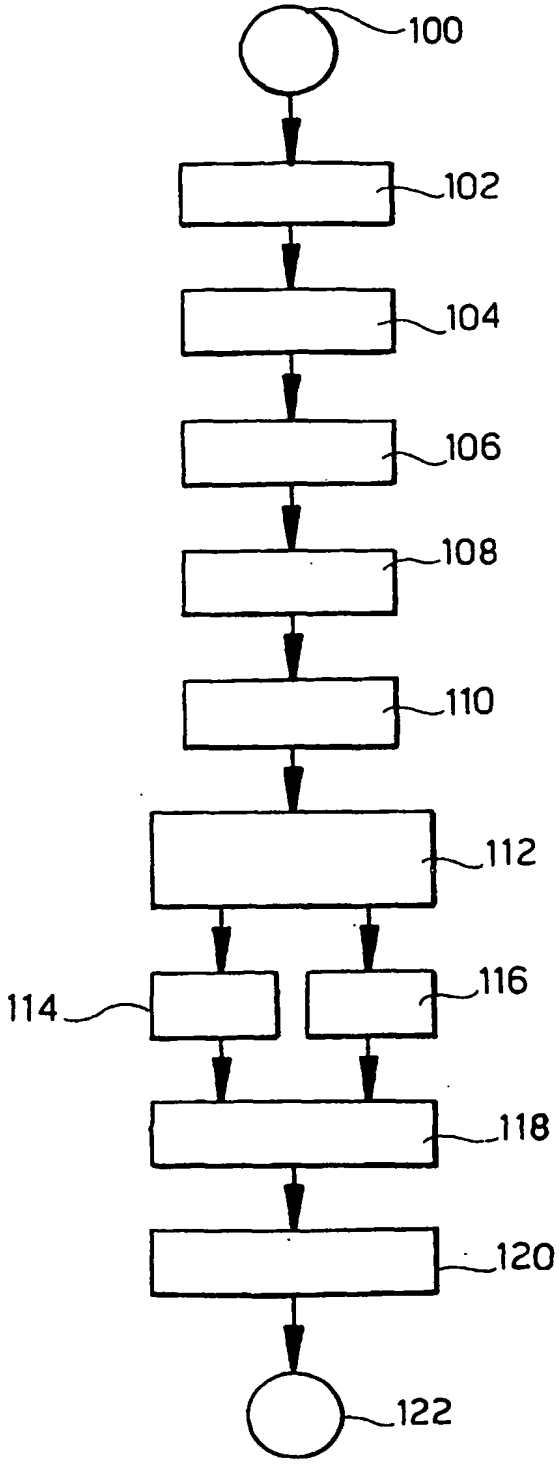


FIG. 2



INTERNATIONAL SEARCH REPORT

International Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M15/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 00 59199 A (CANAVAN ANGELA ROSE ;GAULT WILLIAM JAMES (GB); ANDERSON SAMUEL (GB) 5 October 2000 (2000-10-05) page 6, line 23 -page 9, line 8 page 14, line 8 -page 15, line 9 ---	1-5
Y	US 6 134 307 A (HAKL SHAWN PAUL ET AL) 17 October 2000 (2000-10-17) column 4, line 35 -column 5, line 46 ---	1-5
A	US 2001/040947 A1 (GEISBUSCH FERDINAND ET AL) 15 November 2001 (2001-11-15) page 2, line 15 - line 18 page 3, line 21 - line 24 ---	1-5

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 May 2003	03. 06. 2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	CATHARINA KARLSSON/JA

Form PCT/ISA/210 (second sheet) (July 1992)

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International Application No
PCT/[redacted]03/01978

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